

A CASE OF MODIFIED LARYNGECTOMY FOR EPITHELIOMA OF THE LARYNX; RECOVERY.

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ON November 12, 1888, Mrs. C. D., aged fifty-eight, married, was admitted to my service at the M. E. Hospital, with the following history: For the past two or three years the patient has noticed a gradual and progressive hoarseness. Five months preceding admission, she first consulted me for the relief of this hoarseness, which very shortly thereafter amounted to complete aphonia. Laryngoscopic examination at this time revealed a neoplasm upon the anterior portion of the left vocal cord, and I referred her to my friend, Dr. T. R. French, of this city, for further examination and advice concerning the necessity for an immediate operation for the removal of the growth. He confirmed my diagnosis of malignant disease of the larynx, and agreed with me in the desirability of attacking the growth and that the extra-laryngeal method of operation was the only one justifiable under the circumstances.

She returned to her home in the country to make preparations for the operation, intending to return in the course of a fortnight. During the next few months I heard, through a friend, that a decided improvement had taken place in her voice, and that, encouraged by this fact, she hesitated before accepting my advice. I requested that she return to the city, in order that another examination be made, to which request she acceded, and in November she again visited Brooklyn, and allowed me to re-inspect her larynx. It was then found that the growth had considerably increased in size, the visible portion projecting well beyond the free margin of the vocal cord, and occupying most of its length.

FIG. 1.



Showing parts during ordinary respiration. (Hemi-tone, after photograph by Dr. T. R. French.)

FIG. 2.



Showing parts during phonation. (Hemi-tone, after photograph by Dr. T. R. French.)

The improvement in the voice was evidently due to the fact that, whereas, when the aphonia was complete, the left vocal cord was so crippled by the growth that its function was practically abolished, later on, as the growth increased in size, the right vocal cord could be brought into contact with the former, and thus phonation was reestablished.

Dr. French again examined her at this time, and succeeded in photographing the parts as they appeared, both in ordinary respiration and

in phonation (Figs. 1 and 2). It was decided to give her the benefit of an extirpation of the larynx by the modified procedure suggested by Prof. J. Solis-Cohen, of Philadelphia, but which, up to this time, had never been performed upon the living subject.¹ Accordingly, on November 13th, the day following her admission to the hospital, a low tracheotomy was performed, preliminarily; in order to accommodate an extra large sized tracheotomy canula, an oval piece was removed from the front wall of the trachea. A few superficial sutures were applied, in order to close the wound below the tube. The parts were dressed with an artificial cuticle of collodion and sub-iodide of bismuth.

On November 17th, four days following the tracheotomy, it being found that complete toleration of the presence of the tracheal canula had been established, the operation of modified laryngectomy was performed in the presence of Prof. J. Solis-Cohen, Drs. T. R. French, B. F. Westbrook and Bryson Delavan, together with the hospital staff. The anæsthetic used was nitrous oxide, administered by Dr. George W. Brush, of this city. The method of administering the anæsthetic was by means of a coupling made to fit the opening of the tracheal canula, and attached by a piece of flexible tubing to the ordinary inhalation apparatus of the dentists. Inasmuch as the operation differed in one or two particulars from the procedure suggested by Prof. Solis-Cohen, I have thought it best to describe the different steps of the operation in this the first application of the new method. The operation as performed by myself is as follows:

An incision was made from the upper border of the hyoid bone to the first ring of the trachea. This was afterward extended to the tracheotomy wound. The structures overlying the thyroid were separated from about one-half to three-quarters of an inch on either side of the angle of junction of the two wings of this cartilage; the isthmus of the thyroid body was divided with the thermo-cautery. The crico-thyroid muscles were divided near their attachments to the thyroid cartilage, the soft parts were retracted to either side, when, all hemorrhage being arrested, the cricoid cartilage was separated from the first ring of the trachea by a transverse incision. The stump of the trachea was drawn forcibly forward and rapidly packed with gauze by an assistant, while the cross incision was being made. A silk ligature was passed through the first ring of the trachea and tied in a loop, in such a manner that the stump of the trachea could be drawn well forward. By means of narrow-bladed angular forceps each wing of the thyroid was split down to the crico-thyroid membrane at a point about one-quarter of an inch on either side of the angle of junction of the two wings. The interior structures of the larynx were now cleared from the inner surface of the thyroid cartilage; the mucous membrane of the right side peeled off easily, but that on the left side proved to be hard and somewhat unyielding, although it finally separated completely from the underlying thyroid. It was then readily ascertained that the growth occupied this portion of the interior of the larynx, being moulded to the shape of, but not involving the interior surface of the corresponding wing of the thyroid. Both wings of the cartilage being cleared, the soft parts behind and to the sides of the cricoid, including the articulation of the latter

¹ New York Medical Journal, vol. xlv. pp. 682, 683, 1887. Transactions American Laryngological Association, 1887, New York, 1888, ix. 38-40.

with the inferior cornuæ of the thyroid and its connection with the œsophagus, were separated; the attachments of the inferior constrictor muscles of the pharynx to the posterior portion of the thyroid cartilage were not interfered with. The arytenoid cartilages were included in the parts thus dissected. Upon reaching the line of the attachment of the œsophagus to the cricoid posteriorly, the former was opened in the median line, and through the opening thus formed the index finger of the operator's left hand was passed into the pharynx up to the base of the tongue and hooked over the epiglottis. The latter, together with the entire respiratory contingent, was now forcibly drawn downward, so as to identify the attachments of the thyro-hyoid membrane. The latter was now incised, and the epiglottis detached from the aryteno-epiglottidean folds, when a few touches of the knife served to release the whole mass from its remaining attachments.

It was found that the entire diseased mass had come away completely. After ligating a few bleeding points, the stump of the trachea was repacked with dry gauze, and an œsophageal tube was passed about eight inches down the œsophagus, and the parts above and below the section of the gullet, as well as the neighborhood of the feeding tube, as it passed into the latter, were well packed with oxide of zinc gauze; the latter reached well up into the pharynx above the base of the tongue. A large safety-pin was passed crosswise through the œsophageal tube to prevent the latter from slipping into the stomach.

The patient left the table, fully conscious, within a minute after the completion of the dressings and without the slightest symptom of shock, although the anæsthesia by nitrous oxide had been maintained steadily and without the least difficulty for an hour and forty minutes by Dr. Brush. Indeed, had she been allowed to, she would have walked to her room from the operating theatre.

On the following day the dressings were removed and a small Barnes' rubber bag was introduced into the stump of the trachea, distended, and gauze packed down upon it. The wound was repacked and the gauze packing was not allowed to rise in the pharynx above the level of the wound. It was soon found, however, that the simple gauze dressing was equally efficient, and tolerated better than the rubber bag, and the latter was abandoned for the former. The thyroid wings had been somewhat separated, during the operation, from the muscular structures passing upon either side of their outer walls; their divided edges were brought as near in coaptation as possible.

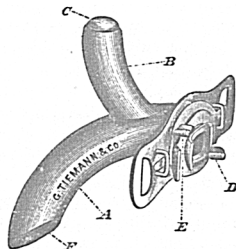
On the second day after the operation, the œsophageal tube was removed, to be again introduced, for purposes of alimentation, at the time of the dressing; but even this caused considerable pain, and finally the tube was left in position eight hours, during which time several feedings were accomplished, the tube being then removed, and the parts remaining undisturbed for four hours.

On the eighth day the tracheal tube was removed from the tracheotomy wound and inserted into the stump of the trachea. About one-eighth of an inch of the edge of each thyroid wing was now found to be somewhat discolored and showed a tendency to curl toward the median line and away from the lateral riband muscles of the laryngeal region. They were accordingly trimmed off with a pair of curved scissors. The entire cavity left by the removal of the larynx contracted with marvellous rapidity, and its walls were found to be covered by

healthy granulations. The upper end of the œsophagus had become very œdematous, and this, when the tracheal tube was removed, served the purpose of an epiglottis in preventing secretions from the pharynx, which found their way down behind the base of the tongue and into the upper portion of the wound, from entering the larynx. Up to this time the patient's diet had consisted of from four to six ounces of peptonized milk, every two hours, and two ounces of whiskey every four hours, with a teaspoonful of beef-juice. On the tenth day following the operation, the patient was allowed to attempt to swallow general fluid diet, such as egg-nog, beef tea, and cocoa.

On the seventeenth day the contraction of the muscular parts upon either side of the remains of the thyroid cartilages had brought the edges of the latter so closely in contact as to render it impossible to pack gauze in that portion of the cavity represented by the parts lying between the wings of the thyroid. The tracheotomy wound had been entirely closed for several days, and the œdema of the œsophagus disappeared. The irritation of a drop of secretion into the stump of the œsophagus caused efforts at swallowing, which act seemed to be perfectly normal. There was a painless contraction of the pharyngeal muscles, which, when it occurred, forced the secretions of the mouth through the wound and out upon the neck.

FIG. 3.



A modified Gussenbauer's artificial larynx. *A*, tracheal canula; *B*, pharyngeal or "chimney" tube; *C*, obturator, in position as in eating; *D*, button for securing ring attached by a wire to obturator; *E*, button for securely holding the chimney tube attached to the tracheal portion of the apparatus. At *F* is shown the lower extremity of the tracheal tube cut off somewhat at an angle.

On the twenty-fourth day after the operation the œsophageal tube was removed from the wound, and thereafter at each time of feeding it was passed through the mouth. The packing of the wound was discontinued and a compress of gauze placed in position over the latter, in order to absorb the secretions from the mouth, which were still discharged through the wound. On the forty-first day a modification of the artificial larynx of Gussenbauer was placed in position.

This modification consists, first, of substituting aluminium for hard rubber or silver as the material from which the apparatus is made; second, in dispensing with the cumbersome projecting ring collar—

which, besides being in the way of the patient's dress collar, is exceedingly awkward to detach and replace by the patient—and replacing it with the flat plate and retaining button of the ordinary silver tracheotomy canula (Fig. 3). With the aid of a little pocket mirror, the patient readily adjusts the different parts of the artificial larynx herself.

The patient can now make herself heard in speaking better than before the operation. On New Year's day, forty-four days after the operation, the patient partook of a hearty meal, principally solid food. On January 29th complete cicatrization having taken place, the patient was discharged cured. On May 25th the patient presented herself at my office prior to her departure for her home in the country. She is able to speak in a loud whisper, although no artificial vocal cords or reeds have as yet been supplied to the artificial larynx which she wears. At the date of writing (August, 1889), there is no evidence of a return of the disease, and the patient expresses herself as being perfectly comfortable and in good health.

Attention has already been called by Prof. Solis-Cohen to the great infrequency with which the thyroid cartilages become invaded with carcinoma or other diseases for which complete or partial laryngectomy is performed. This fact led him to consider both the desirability as well as practicability of modifying the operation in such a manner as to retain this portion of the larynx, while removing those portions already invaded, or liable to invasion, by disease. As a result of this study he advanced the opinion that, not only is it possible to lessen the dangers of the operative procedure itself, as well as the difficulties of the subsequent treatment by leaving a portion of the thyroid cartilages *in situ*, but that, theoretically at least, where the preservation of the attachments of the inferior constrictor muscles of the pharynx to these structures are considered, the functional result may be improved by the operation which he proposed.

So far as the knowledge of the writer goes, the case herewith reported is the first in which this proposition, *i. e.*, the retention of the thyroid cartilages, has been carried out. The result fully justifies the views held by Prof. Cohen concerning the operation itself and the improved functional result. The comparatively small gap left by the incision and removal of the diseased parts, and consequently lessened traumatism inflicted, the readiness with which the parts filled up by the reparative process and the firm support afforded for the artificial larynx, together with the great advantages gained by preserving comparatively unimpaired at least one of the pairs of the muscles of deglutition, will, it is believed, lead to the adoption of this method of operation, to the exclusion of all others, in cases in which laryngectomy is at all applicable.

The growth in this case, upon examination by the hospital pathologist, Dr. Eugene Hodenpyle, proved to be a typical epithelioma.

So far as I know, this is the first attempt that has been made to make an artificial larynx from aluminium. The exceeding lightness of this metal,

as compared with either of the materials heretofore employed (silver or vulcanized rubber) commends it at once to the practical surgeon. Again, the decomposition of the silver by the secretions of the parts, and the consequent formation of soluble argentum compounds, which, as has been claimed, are not without deleterious effects when absorbed into the system, are not to be lost sight of.

At *F* (Fig. 3) is shown the end of the tracheal canula cut off at somewhat of an angle; the effect of this is to increase slightly the capacity of the opening at the point at which the air enters the canula, as well as to prevent the anterior edge of this opening from impinging against the wall of the trachea.

A CASE OF EXSECTION OF THE ENTIRE ULNA, WITH RESECTION OF THE HUMERUS AND RADIUS.¹

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THE removal of bones in part, or totality, may, owing to various morbid conditions and injuries, be necessitated. The indications for these procedures when due to pathological processes, malignant or otherwise, are frequently resident in the short, flat, or mixed bones or in the epiphysal portions of the long. It is comparatively seldom that the disease pervades a long bone in its entirety, and so the complete exsection of a bone of this class together with its periosteum is rarely demanded. So rare, indeed, is this requirement, that in many of the text-books of surgery the subject receives but passing notice. The subperiosteal removal of a greater part of a long bone is not an unusual occurrence; and both Agnew and Gross mention entire exsections by a number of operators. According to these authorities, Carnochan, of New York, exsected the entire ulna in 1853. Muscroft, of Cincinnati, in 1870, and Hutchison, of Brooklyn, in 1873. Several other similar operations have been done. The one by Dr. George Williams, in which the ulna with the lower end of the humerus and the head of the radius were removed, would appear to resemble closely my operation; but as it was done for necrosis, I am inclined to think that this, as well as all of the other *entire* exsections, was to a great extent subperiosteal.

In several other of the more recent works on operative surgery (Jacobson, Stephen Smith, Wyeth, and others) complete exsections of the long bones are mentioned, but only comparatively briefly described. Wyeth shows in a woodcut, the result of a subperiosteal exsection of the

¹ Read before the Medical and Chirurgical Faculty of Maryland, Session, April, 1889.